(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 604 731 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
16.06.1999 Bulletin 1999/24

(51) Int. Cl.^{6}: **B32B 31/00**, B29C 55/02, A61F 13/15

(21) Application number: **93117426.2**

(22) Date of filing: **27.10.1993**

(54) Stretch-pillowed, bulked laminate

Durch Strecken gewelltes, gebauschtes Laminat

Laminé ondulé, volumineux obtenu par étirage

(84) Designated Contracting States:
BE DE ES FR GB IT NL SE

(30) Priority: **29.12.1992 US 997800**

(43) Date of publication of application:
06.07.1994 Bulletin 1994/27

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EP 0 604 731 B1

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Printed by Xerox (UK) Business Services
2.16.7/3.6

Description

[0001] The present invention relates to a highly bulked stretch-pillowed laminate and a process for forming a preferred embodiment thereof.

[0002] The materials of the present invention are suitable for a wide variety of applications where substantially three-dimensional, bulky, cloth-like materials are useful. This is in comparison to substantially two-dimensional materials and composites such as individual layers of film and/or nonwovens or plain laminates of such materials. While not meaning to limit the scope of the present invention, one area of particular usefulness for the materials of the present invention is in personal care absorbent articles such as diapers, incontinence garments, training pants, feminine pads, sanitary napkins, bandages and the like. Many of these materials are multi-layered structures which use tissue and wood based fibers as well as nonwovens and polymeric films to form specific layers of the overall structure. Oftentimes these layers can benefit from a more bulky feel. As an example, diapers employ a lining material which usually includes a polymeric nonwoven web made from a plurality of fibers bonded to one another. Such a liner material must be soft to the baby's touch for comfort while also being able to quickly absorb and then transfer body fluids to the absorbent interior core material. Generally, from a consumer's standpoint, the softer and bulkier the liner material is, the higher the perception will be of the quality and comfort of the material. In the same fashion, the backing of the diaper generally includes a plastic film or some other material to provide liquid-barrier properties so as to retain exuded body fluids. Sometimes this layer may include a nonwoven layer to impart a certain cloth-like feel thereby increasing both the quality and comfort of the overall product.

[0003] Consumer testing has indicated that three-dimensional, "bulky" materials are perceived as being of higher quality than "non-bulked" two-dimensional structures. Two dimensional structures are often the result of the lamination of two juxtaposed layers of film, nonwoven, tissue and/or other natural or synthetic based materials. Such two dimensional layers do not have a high degree of bulk as their combined thickness is usually equal to or less than the combined thicknesses of the individual layers prior to lamination. Quilted materials are frequently perceived by the consumers as having a higher degree of bulk, softness and comfort. Imparting a quilt-like look to the laminated layers usually involves either actually stitching the layers together or bonding the layers together with some type of three dimensional bond pattern. Here again, however, the overall thickness of the quilted product is generally no greater than the combined thicknesses of the joined layers as the quilting process usually results from the reduction in thickness of the combined layers in the areas where the quilting pattern has been imparted.

[0004] Another way to impart a more bulky feel and look to materials is to make an elastic laminate such as is taught in WO 90/06228, US-A-4,720,415 or EP 556 749 (not pre-published). Materials such as these include an elastomeric material which forms a stretchable, elastic layer. To at least one side of this material while in a stretched condition there is attached another gatherable layer. Once the two layers have been attached to one another, the elastic layer is allowed to retract thereby gathering up and puckering the non-elastic gatherable layer to form more of a three-dimensional material. While such elastomeric materials are suitable for use in the same products as the present invention, they are definitely more costly due to the use of elastomeric polymers. The present invention overcomes this cost factor by using more less expensive materials. Furthermore in contrast to the known materials , the materials of the present invention once formed are non-elastic in nature.

[0005] It is therefore an object of the present invention to provide a material which while made from relatively flat planar two-dimensional materials creates more of a three-dimensional, bulky pillowed material once two or more layers have been attached to one another.

[0006] It is another object of the present invention to provide a material which can be made more three-dimensional in appearance while using relatively inexpensive components.

[0007] It is a further object of the present invention to provide a material with such properties which is substantially non-elastic.

[0008] It is yet another object of the present invention to provide a process for making such materials.

[0009] These and other objects of the present invention will become more apparent upon a further review of the following specification, drawings and claims.

[0010] This invention relates to a bulked, stretch-pillowed laminate and to according to claim 1 a process for forming a preferred embodiment thereof according to claim 8.

[0011] While a number of material are suitable for use with the present invention, two specific combinations which work particularly well are where the first layer is a thermoplastic film and the second layer is a nonwoven fibrous web or, alternatively, where both the first and second layers are made from fibrous nonwoven webs. The film/nonwoven composite has the combined advantages of being liquid impervious while also providing a soft, bulky feel on one side of the material which makes the composite particularly useful as an outercover material for personal care products including diapers, training pants and incontinence garments. The nonwoven/ nonwoven configuration also has particular usefulness in the area of personal care products as a liner material for such products.

[0012] In more refined embodiments of the present invention, the process may be further modified by adding yet an

additional layer to the bulked, stretched-pillowed laminate material. For example, a third layer of material may be added to the side of the first layer (while the first layer is in a stretched condition) which is opposite the side to which there is attached the second layer. The attachment of the third layer to the first layer may be accomplished in at least two ways. The first way involves passing all three material through the same bonding equipment so that the bond points of the second and third layers to the first layer are in vertical registry with one another. The second way involves using two sets of bonding equipment such that the first and second layers are attached to one another in a first bonding process and then the third layer is added to the composite via a second bonding process such that the bond points between the first layer and the second layer are not in vertical registry with the bond points between the first and third layers. It also should be noted that depending upon the speeds at which the second and third layer are fed into the process, either or both of the second and third layers may be stretched, though their degree of stretch is less than that of the first layer. Furthermore, it is possible to stretch any one of the foregoing layers in more than one direction or in directions that are not parallel to one another with respect to the individual layers.

[0013] Attachment of the various layers to one another can be accomplished by a variety of means including adhesives, ultrasonic bonding, thermo-mechanical bonding and stitching. Suitable adhesives include water-based, solvent-based, pressure-sensitive, and hot-melt adhesives.

[0014] Extension of the first layer can be from as little as 5% to as much as 1200% of the original length of the first layer. Usually, when stretching the first layer several hundred percent or more, the first layer will permanently deform such that upon relaxation of the stretching forces, the first layer only retracts a small portion of the distance that the first layer was initially stretched. As a result, the retracted or third length will oftentimes be between about 80 and 98% of the expanded length. A notable attribute of the material of the present invention, however, is that upon retraction of the first layer, the second layer will have a greater surface area than the first layer per the same unit area of the composite.

Figure 1 is a cross-sectional side view of a stretch-pillowed laminate according to the present invention.

Figure 2 is a schematic side view of one process for forming a stretch-pillowed laminate according to the present invention.

Figure 3 is a schematic side view of another process for forming a stretch-pillowed laminate according to the present invention.

Figure 4 is a schematic side view of yet another process for forming a stretch-pillowed laminate according to the present invention.

Figure 5 is a cross-sectional side view of another stretch-pillowed laminate according to the present invention.

Figure 6 is a cross-sectional side view of yet another stretch-pillowed laminate according to the present invention.

Figure 7 is a schematic side view of yet another process for forming a stretch-pillowed laminate according to the present invention.

[0015] The present invention is related to a highly-bulked, stretch-pillowed material formed by bonding, laminating or otherwise attaching two or more layers to one another. One of the layers is stretched and permanently deformed from a first or original length L1 to a second length L2 which is greater than its original length. After the first layer has been stretched, and while it is still in a tensioned condition a second layer is attached to the first layer. Due to the nature of the stretching of the first layer, the first layer still has some degree of recovery. As a result, after the two layers have been attached to one another, the tension is released and the layers are allowed to retract slightly to a third length L3 which is greater than the first or original length L1 of the first layer yet slightly less than the second, stretched length L2 of the first layer. Due to the slight recovery of the first layer, the second layer tends to gather and form pillows thereby imparting a bulky, more three-dimensional appearance to the composite. This is because the second layer 14 has a larger surface area than the first layer 12 per the same unit area of the composite 10. In addition, there can be a savings in the amount of material used for the first layer as the first layer can be thinned during the stretching and deformation process. It should be understood that in the context of the present invention, the term "layer" can be meant to include a single piece or sheet of material as well as a laminate made from a plurality of individual sheets of material.

[0016] The material of the present invention has a wide variety of uses including, but not limited to, personal care applications such as diapers, feminine pads, training pants, adult incontinence products, sanitary napkins, bandages and the like. The material of the present invention also has applicability in the area of clothing due to the comfortable, bulky nature of the material. In addition, the material of the present invention has possible applications as a padded package and/or envelope material as well as a filter media. As a result, these and other applications are meant to be within the scope of the present invention and, therefore, the examples contained herein should be considered as illustrative only and not as limiting to the scope of the present invention.

[0017] Turning to Figure 1, the stretch-pillowed material 10 of the present invention includes a first extensible layer 12 and a second layer 14. By extensible it is meant that the material is capable of being stretched from a first or original length L1 to a second and greater length L2 and then, upon release of the stretching forces, the material retracts to a third length L3 which is less than the second length L2. The first and second layers 12 and 14 respectively can be made

from a wide variety of materials including films, nonwoven materials, woven materials, knits, scrim and tissue. The films can be made from breathable or non-breathable materials. In addition the films can be apertured. In forming the films, the films may be coextruded to increase bonding and the films may be filled with an opacifying agent such as titanium dioxide. The nonwoven materials can be made from longer more continuous fibers such as spunbond and meltblown fibers or from shorter staple fibers such as are used in bonded carded webs. Suitable fibers include natural and synthetic fibers as well as bicomponent and multi-component/polymer fibers. The nonwoven webs may be hydroentangled and they can be formed using any number of techniques including spunbonding, meltblowing, solution spinning and wet laying. In addition, laminated layers such as spunbond/meltblown/spunbond composites can be used for either the first or second layer. The woven and knit materials can be made from both synthetic and natural fibers. They also can be made from combinations of both natural and synthetic fibers. Tissue based layers are typically made from natural fibers such as pulp, but they can also include synthetic fibers.

[0018] Combinations of anyone of the foregoing materials may be employed for forming the material of the present invention. Examples of but a few combinations include: film/nonwoven; film/woven; film/knit; film/tissue; film/film; nonwoven/ nonwoven; nonwoven/woven; nonwoven/knit and nonwoven/tissue. It is also possible to form multi-layered materials so long as they include a first layer 12 and a second layer 14 as further described below.

[0019] The first layer 12 as described herein and depicted in Figure 1, must be made from a material which is capable of being stretched or extended in at least one direction from a first length L1 to a second length L2 with the second length being greater than the first length. During the stretching or extending process, the materials used for the first layer permanently deform so that upon relaxation of the stretching forces the first layer does not return to its original length L1 but instead retracts from its second length to a third length L3 which is slightly less than the second length but greater than the first length. Generally this retraction is from about 2 to about 20% of the expanded or second length L2 of the first layer. Materials which permanently deform are useful because the first layer can be greatly thinned thereby reducing the cost of the composite. During the stretching or extension of such materials, the first layer should be capable of being deformed from at least about 5 to as much as 1200% or greater of its original or first length. For example, a piece of material one foot in length which is stretched 1200% would have a stretched length of thirteen feet.

[0020] Once the first layer has been bonded to the second layer and the composite has relaxed, the newly formed composite should not be capable of stretching more than 25% of the composite's relaxed length L3 without affecting the lamination or bonding of the first layer 12 to the second layer 14. Consequently, in choosing a material for the first layer 12 from the above noted materials, the material must be chosen such that it is capable of being stretched, optionally deformed, and relaxed according the foregoing parameters. In the present invention, the first layer is distinguished from a traditional "elastic" material which is capable of being stretched from a first length to a second length and then retracting back to a length substantially the same as the first length.

[0021] The second layer 14 of the present invention can be selected from any one of the foregoing materials indicated as being suitable for the first layer of the present invention. In addition, the material of the second layer 14, unlike the first layer 12, can be elastic in nature though when attached to the first layer, the second layer 14 should be expanded less than the degree of expansion of the first layer.

[0022] The purpose of the second layer 14 is to provide the bulkiness in the overall laminate or composite 10 by puckering or gathering when the first layer 12 is allowed to relax or retract from its second length L2 to its third length L3. It is also important to note that in order to attach the first layer 12 to the second layer 14, the second and first layers must be compatible with one another through the use of adhesives, thermobonding, ultrasonic bonding, stitching or other suitable means of attachment. When using adhesives, the adhesives may be water-based, solvent-based, pressure sensitive or hot-melt adhesives.

[0023] As can be seen in the cross-section of Figure 1, the first layer 12 and the second layer 14 are joined to one another at a plurality of separate and spaced apart locations such that there are a plurality of bonded areas 16 and unbonded areas 18. In fact, depending upon the spacing of the bond points 16, the unbonded areas 18 may actually form unbonded pockets between the first layer 12 and the second layer 14. These pockets optionally may be filled with particulate or fibrous material such as a superabsorbent. Bonding of the first layer 12 to the second layer 14 may be achieved through any number of suitable means including, but not limited to, heat activated and solvent-based adhesives, as well as the actual fusion of the first layer to the second layer through the use of heat and/or pressure as well as through the use of ultrasonic bonding techniques.

[0024] The process for forming the material 10 of the present invention is shown in schematic form in Figures 2 and 3 of the drawings. For purposes of illustration only, the first layer 12 is described as being a thermoplastic film such as polypropylene film and the second layer 14 is a layer of nonwoven spunbonded material made from extruded polypropylene fibers. The material of the first layer 12 is shown as being unwound from a supply roll 20 though it is possible when using films with the present invention to extrude the film in line as part of the process. The second layer 14 as shown in Figures 2 and 3 is unwound from a second supply roll 22 and, along with the first layer 12, is sent through a bonder 30. To create stretch in the first layer 12, the first supply roll 20 is driven or retarded at a first speed V1 and the second supply roll 22 is driven at a second speed V2 while the take-up roll 32 is driven or retarded at a third speed V3.

At the point of bonding at the bonder 30, the first layer 12 and the second layer 14 have a common speed V0. Prior to the bonder 30 the speed V2 of the second layer 14 can be less than or equal to V0 but in either event V1 is less than V2. By running the first supply roll 20 at a slower rate than second supply roll 22 there is a stretch imparted to the first layer 12 such that the film of first layer 12 is stretched at least 5% beyond its original length. While the first layer 12 is in its stretched state, the second layer 14 is bonded to the first layer 12. In Figure 2, the first and second layers 12 and 14 are shown being bonded to one another through the use of adhesive and pressure via bonding equipment 30, including an anvil roll and a pattern/smooth roll, and an adhesive sprayer 31, both of which are well known to those of ordinary skill in the art. Alternatively, as shown in Figure 3, the adhesive sprayer 31 may be deleted in which case it is desirable to apply heat to one or both of the bonding rolls 30. Also, when using only heat and pressure to bond the layers together, it should be remembered that the two layers should be made of materials which are compatible with one another. The bonding equipment 30 serves to bond the two layers to one another across the width of the material in the cross-machine direction. By selecting the bond pattern on the pattern roll, the bond points 16 can be spaced at regular or irregular distances from one another along the material 10 in the machine-direction so that there are a plurality of bonded 16 and unbonded 18 sites along the length of the material as shown in cross-section in Figure 1. Alternatively, the bond points 16 may be continuous lines of bonding which are parallel or skewed and which can be intersecting or non-intersecting.

[0025] Once the first and second layers 12 and 14 have been bonded to one another, the composite 10 is wound around a take-up roll 32 which is traveling at a speed V3 which is less than the speed V2 of second supply roll 22. As a result, the composite material 10 can relax from the stretched state between the supply rolls 20 and 22 and the bonder 30 to a relaxed condition beyond the bonder 30 so that the composite material 10 can be wound on take-up roll 32. As the composite material 10 relaxes between the bonder 30 and the take-up roll 32, the first layer 12 relaxes from between about 2 and about 20% of the expanded length between the first supply roll 20 and the bonder 30 thereby causing the second layer 14 to gather up or pillow as shown in Figure 1 to create a three-dimensional structure as compared to a simple two-ply laminate. Alternatively, the take-up roll 32 can be driven at the same speed as the bonder 30 in which case the composite material 10 will be wound-up while still in a stretched state. In this case the material 10 will relax slightly while on the roll 32 and the remainder of the relaxation can be achieved as the composite 10 is unwound from the roll 32.

[0026] As mentioned previously, when using film as the first layer, the first layer may be stretched to many times its original length, in fact as much as 1200% or more. During such stretching the film will permanently deform. An important feature of the present invention is the fact that the first layer 12 is permanently deformed during the stretching process between first supply roll 20 and the bonder 30. Again referring to Figures 2 and 3, while on the supply roll 20, the first layer 12 has a first length L1. Due to the differential speed between the first supply roll 20 and bonder 30, first layer 12 is stretched to a second length L2 with L2 being greater than L1. Depending upon the particular material being used for first layer 12, the degree of stretching necessary to permanently deform first layer 12 may be as little as 5% to as high as 1200% especially when using various plastic films as the first layer 12. In any event, however, it should be remembered that in extending the first layer from L1 to L2 the material of first layer 12 is permanently deformed so that upon relaxation after the bonder 30, the relaxed length L3 is slightly less than the stretched length L2 but much greater than the original or first length L1 due to the permanent deformation of the material during the stretching process. As a result, the cost of the overall material may be reduced due to the savings in the film layer.

[0027] In Figures 2 and 3 of the drawings, the material 10 of the present invention is shown as being made into a two ply laminate with stretch and relaxation being imparted in only one direction (the machine direction). With the equipment available today it is also possible to stretch the first layer 12 in more than two directions which may be offset with respect to one another at any desired angle including right angles and angles greater than or less than 90°. Besides stretching the first layer 12, the second layer 14 can also be stretched before the two layers are laminated together. It is desirable, however, that the degree of extension or stretching of the second layer 14 be less than that of the first layer 12. The stretching of the second layer 14 can be substantially parallel to the direction of extension of the first layer 12 or it can be non-parallel or even perpendicular to the direction of extension of the first layer 12.

[0028] It is also possible to create materials 10 which are multilayered laminates. As explained earlier, the second layer 14 may itself be made from a laminate of several layers such as a composite of spunbond/meltblown/spunbond materials bonded to one another prior to the composite being bonded to the first layer 12. The same is true with respect to the first layer 12.

[0029] Referring to Figures 4 and 7 which are schematics of alternate processes according to the present invention, it also is possible to create a laminate with three or more layers. As shown in Figures 4 and 7, the process equipment in operation is identical to that of Figure 3 except for the addition of a third layer 15 bonded to the side of first layer 12 opposite that of second layer 14. The third layer 15 in its simplest construction can be laminated to the first layer 12 in an unstretched state. Conversely, the third layer 15, as with the second layer 14, may be stretched in a direction either parallel or non-parallel to the direction of stretch of the first and second layers prior to its being bonded to the first layer 12.

[0030] As with the process shown in Figure 3, in the process of Figure 4, first layer 12 is unwound from supply roll 20, second layer 14 is unwound from supply roll 22 and third layer 15 is unwound from supply roll 23. While first layer 12 is in a stretched and optionally a permanently deformed condition between supply roll 12 and bonder 30, second layer 14 and third layer 15 are bonded at a plurality of separate and spaced apart locations to the opposites sides of first layer 12 via the heated pattern and anvil bond rolls 30. After the three layers have been joined to one another to form the composite 10, the composite 10 is allowed to relax between the bonder 30 and the take-up roll 32 thereby creating a material similar to that shown in cross-section in Figure 5 of the drawings.

[0031] In Figure 5, the third layer 15 is attached to the first layer 12 at a plurality of spaced apart and separate bond sites 19 which are in vertical registry with the bond sites 16 of the second layer 14. As with the unbonded regions 18 between the first layer 12 and the second layer 14, there is also created a plurality of unbonded areas 21 between the third layer 15 and the first layer 12.

[0032] Referring to Figure 6, it is also possible to create a material 10 from three layers wherein the bond sites 16 and 19 are not in vertical registry with one another. This is possible by using two separate sets of bonding equipment 30 and 30' as shown in Figure 7. In Figure 7 the process is the same as that shown in Figure 4 except for the use of two pieces of bonding equipment 30 and 30'. The bonding equipment 30 is used to create a first plurality of bond site 16 as shown in Figure 6 between the first layer 12 and the second layer 14. While the first layer 12 is still in a stretched and deformed condition, a second piece of bonding equipment 30' is used to bond the third layer 15 to the first layer 12 at a second plurality of bond sites 19 (see Figure 6) which are not in vertical registry with the bond sites 16.

[0033] Given the wide number of materials possible with the present invention, a number of example materials were made as described in further detail below.

EXAMPLE 1

[0034] The stretch-pillowed laminate material according to the present invention in Example 1 was formed using a 16,51 μm (0.65 mil) soft polypropylene film layer as the first or extensible layer of the composite. The polypropylene film layer was made from a Himont Catalloy polypropylene resin from Himont U.S.A., Inc. of Wilmington, Delaware and had a basis weight of 16,28 g/m^2 (0.48 ounces per square yard - osy). The second or bulked layer was a polypropylene spunbond nonwoven web-made by Kimberly-Clark corporation of Neenah, Wisconsin using an Exxon 3445 polypropylene resin from Exxon Chemical Company of Houston, Texas. The spunbond polypropylene nonwoven web utilized 0,11 to 0,33 tex (1 to 3 denier)fibers, had a basis weight of 14,58 g/m^2 (0.43 ounces per square yard) and was prebonded with an overall bond area of 15%. The film and nonwoven web were subjected to a bonding process similar to that shown in Figure 2. The film was bonded to the nonwoven layer using a National 34-5541 hot melt adhesive from National Starch and Chemical Company, a subsidiary of Unilever United States, Inc., of New York, New York, at an application rate of 0,3 g/m^2 (0.009 ounces per square yard) using a swirl pattern application die. As shown in Table 1, the extensible polypropylene film layer was driven at a speed V1 of 49,76 m/min (143 feet per minute), the spunbond web layer was traveling at a speed V2 of 57,42 m/min (165 feet per minute) and at the point of lamination the composite was traveling at a speed V0 of 57,42 m/min (165 feet per minute). On the winder roll the composite was being taken-up at a speed V3 of 56,72 m/min (163 feet per minute. In Example 1 the film was stretched 15% beyond its original or first length L1 before the nonwoven web layer was bonded to the film layer. The stretched length corresponded to the second length L2 discussed above. After the bonding process the film/nonwoven web composite was allowed to retract from its second length L2 to a third length L3. As can be seen in Table 1, the bulk B_2 of the stretched composite laminate was 0,7 mm (0.0275 inches) and the basis weight (BW_2) was 39,34 g/m^2 (1.160 ounces per square yard). This in comparison to the bulk (B_1) and the basis weight (BW_1) of the materials as if they were in a non-stretched state in which case the bulk (B_1) would be 0,27 (0.0108 inches) and the basis weight (BW_1) would be 31,03 g/m^2 (0.915 ounces per square yard). To calculate the percent change in both bulk and basis weight between the nonstretched and stretched (bulked) materials the following formulas were used:

$$\% \text{ Bulk change} = \frac{B_2 - B_1}{B_1} \times 100$$

$$\% \text{ Basis Weight Change} = \frac{BW_2 - BW_1}{BW_1} \times 100$$

[0035] Thus the percent change in bulk was [(0.0275-0.0108)/0.0108] x 100 or 154% and the percent change in basis weight was [(1.160-0.915)/0.915] x 100 or 26% which represented an increase in both the bulk and basis weight of the bulked and stretched laminate as opposed to a non-bulked and non-stretched material.

[0036] The percent stretch and percent recovery for the composite material of Example 1 were calculated using the following equations:

$$\% \text{ Stretch} = \frac{V_0 - V_1}{V_1} \times 100$$

$$\% \text{ Recovery} = \frac{V_0 - V_3}{V_0} \times 100$$

Thus the percent stretch for the material of Example 1 was [(165-143)/143] x 100 or 15% while the percent recovery was [(165-165)/(165-143)] x 100 or 9%. Consequently, the film layer was stretched 15 percent beyond its unstretched length, the nonwoven layer was bonded to it and the composite recovered 9 percent of the 15 percent that the film was stretched thereby causing the bulking of the composite.

[0037] Once the composite had been formed, a sample of it was tested to see how much strain the sample could be placed under before it delaminated. As stated earlier, the material of the present invention is to be distinguished from composite materials wherein the composite is still elastic once formed. As a result, the material of the present invention once formed is not able to stretch more than 25 percent beyond its relaxed or finished length L3 without adversely affecting the material. To determine this, a simple test was run.

[0038] First, a 7,6 cm by 12,7 cm (three inch by five inch)sample but and clamped between the jaws of an Instron tensile machine set with a jaw separation of 7,6 cm (three inches). It is important to note that the 12,7cm (five inch)length was parallel to the stretch direction of the first layer of the composite. Next the jaws were expanded at a rate of 1,27 m (fifty inches) per minute until the gap between the jaws has been expanded from 7,6 cm to 9,52 cm (three inches to three and three quarter inches), an expansion of twenty-five percent. Once this gap distance had been achieved, the machine was stopped and the sample was held for one minute before the tension was released and the sample was removed from the jaws. The sample length was then measured and the sample was visually examined for signs of failure, including delamination between the layers and/or a breakdown in structure of the individual layers. A visual examination of the material of Example 1 showed that the material had failed, thus demonstrating that the sample was not elastic.

TABLE 1

EXAMPLE: ADHESIVE / NONWOVEN / FILM

EXTENSIBLE LAYER: 16,51μm(0.65 mil)softpolypropylene	V1=49,76(143)
BULKED LAYER: 14,58 g/m^2(0.43 ox/yd2)Polypropylene Spunbond	V2=57,42(165)
LAMINATION: 0,3g/m^2(0.009 ox/yd2)Hot Metal Adhesive	V0=57,42(165)
	V3=56,72(163)

Adhesive applied by a swirl pattern die

BULK ENHANCEMENT:

Nonstretched Laminate	Bulk (B_1): 0,27mm(0.0108")
	Basis Weight (BW_1): 31,03g/m^2(0.915 oz/yd2)
Stretched Laminate	Bulk (B_2): 0,7mm(0.0275")
	Basis Weight (BW_2): 39,34g/m^2(1.160 oz/yd2)
% Change	Bulk: 154%
	Basis Weight: 26%

% STRETCH: $\frac{165-143}{143} * 100 = 15\%$

% RECOVERY: $\frac{165-163}{165-143} * 100 = 9\%$

Laminate Testing: Laminate failed at or before 25% elongation.

EXAMPLE 2

[0039] In Example 2 a stretch-pillowed laminate material according to the present invention was formed using a 16,51 μm mil) film layer which was the same as that described in Example 1. The second or bulked layer was a polypropylene spunbond nonwoven web made by the Kimberly-Clark Corporation of Neenah, Wisconsin using an Exxon 3445 polypropylene resin from Exxon Chemical Company of Houston, Texas. The spunbond polypropylene nonwoven web utilized fibers having a linear density of approximately 0,14 tex (1.3 den). The web had a basis weight of 10,17 g/m^2 (0.3 ounces per square yard) and the web was prebonded with an overall bond area of 12%. The film and nonwoven web were subjected to a thermal bonding process such as is shown in Figure 3. Referring to Table 2, the extensible polypropylene film layer was driven at a speed V1 of 0,9 m/min (2.6 feet per minute), the spunbond web layer was traveling at a speed V2 of 3,6 m/min (27.6 feet per minute)and at the point of lamination the composite was traveling at a speed V0 of 10,86 m/min (31.2 feet per minute). On the winder roll the composite was being taken-up at a speed V3 of 8,53 m/min (24.5 feet per minute). In Example 2 the film was stretched 1100% beyond its original or first length L1 before the nonwoven web layer was bonded to the film layer. The stretched length corresponded to the second length L2 discussed above. After the bonding process, the film/nonwoven web composite was allowed to retract from its second length L2

to a third length L3. Referring again to Table 2, the bulk (B_2) of the stretched composite laminate was 0,36 mm (0.014 inches) and the basis weight (BW_2) was 15,43 g/m^2 (0.455 ounces per square yard). This is in comparison to a bulk (B_1) of 0,12 mm (0.0047 inches) and basis weight (BW_1) of 28,31 g/m^2 (0.835 osy) for the materials as if they were in a non-stretched state. The percent change in both the bulk and basis weight between the non-stretched and stretched (bulked) materials were calculated as in Example 1. The percent change in bulk was 198% and the percent change in basis weight was -45.5%. This represents a net decrease in the basis weight of the material while still showing an increase in the bulk. This was due to the extreme stretching of the film which caused the reduction of basis weight in the film layer and thus a reduction in the overall basis weight of the composite. However, upon bonding of the two layers to one another, there was still a retraction process which caused the nonwoven layer to pucker and gather thereby explaining the increase in bulk.

[0040] The percent stretch for the material in Example 2 was 1100% while the percent recovery was 23,4%. Consequently, the film layer was stretched 1100% beyond its unstretched length, the nonwoven layer was bonded to the stretched film and the composite recovered 23,4% of the 1100% that the film was stretched thereby causing the bulking of the composite.

[0041] Once the composite has been formed, a sample was tested and failed before reaching an elongation of 25%.

TABLE 2

EXAMPLE: NONWOVEN / FILM

EXTENSIBLE LAYER:	16,51µm(0.65 mil)soft polypropylene film	V1=0,9(2.6)
BULKED LAYER:	10,17g/m^2(0.3 oz/yd2)PP Spunbond 0,14 tex (1.3dpf)	V2=9,6(27.6)
LAMINATION:	Thermal Point Bonded (12% Bond Area)	V0=10,86(31.2)
		V3=8,53(24.5)

Process Conditions:	Pattern Roll Temperature:	113°C(235°F)
	Anvil Roll Temperature:	108°C(226°F)
	Nip Pressure:	0,15N/mm^2(22 psi)

BULK ENHANCEMENT:

Nonstretched Laminate	Bulk (B_1):0,12mm(.0047") Basis Weight (BW_1):28,31g/m^2(0.835 oz/yd2)
Stretched Laminate	Bulk (B_2)0,36mm(0.014") Basis Weight (BW_2):15,43g/m^2(0.455 oz/yd2)
% Change	Bulk: 198% Basis Weight: -45.5%

% STRETCH: $\frac{31,2-2,6}{2,6} * 100 = 1100\%$

% RECOVERY: $\frac{31,2-24,5}{31,2-2,6} * 100 = 23,4\%$

Laminate Testing: Laminate failed at or before 25% elongation.

EXAMPLE 3

[0042] In Example 3, the stretch-pillowed laminate material according to the present invention was formed using two polypropylene spunbond webs. Both webs were made by the Kimberly-Clark Corporation of Neenah, Wisconsin. They each had a basis weight of 27,13 g/m^2 (0.8 osy) and used 0,33 tex (3 denier) fibers fibers extruded from Exxon polypropylene resin. Each of the webs were individually prebonded with an overall bond area of 15%. The two nonwoven webs were subjected to a bonding process similar to that shown in Figure 3. The calender rolls used to bond the two layers together included a pattern roll heated to a temperature of 135°C) (275°F) and an anvil roll heated to a temperature of 135°C (275°F)with the nip pressure being 13,8 N/cm^2 (20 lbs. per square inch). As shown in Table 3, one of the polypropylene spunbond nonwoven webs was driven at a speed V1 of 6,4 m (21 feet) per minute and the second spun-

bond web was traveling at a speed V2 of 8,5 m (28 feet)per minute. At the point of lamination the composite was traveling at a speed V0 of 8,5 m (28 feet) per minute and on the winder roll the composite was being taken-up at a speed V3 of 6,4 m (21 feet) per minute. In Example 3, the web traveling at speed V1 (6,4 m/min or 21 ft/min) was stretched 33% beyond its original or first length L1 before the second nonwoven web was bonded to the first web. The stretched length corresponded to the second length L2 discussed above. The two webs were bonded together using thermal point bonding with a 15% total bond area. After the bonding process the nonwoven/nonwoven web composite was allowed to retract from its second length L2 to a third length L3. As can be seen in Table 3, the bulk (B_2) of the stretched composite laminate was 1,2 mm (0.0465 inches) and the basis weight (BW_2) was 60 g/m^2 (1.77 ounces per square yard). This is in comparison to a bulk (B_1) of 0,41 mm (0.0162 inches) and basis weight (BW_1) of 54,26 g/m^2 (1.6 osy) if the materials were in a non-stretched state.

[0043] Using the formulas denoted in Example 1, the percent change in bulk was 187% and the percent change in basis weight was 10% which represented an increase in both the bulk and basis weight of the bulked and stretched laminate as opposed to a non-bulked and non-stretched material. The percent stretch for the material of Example 3 was 33% and the percent recovery was 100%. Consequently, the first nonwoven web was stretched 33% beyond its unstretched length, the second nonwoven web was bonded to the first and the composite recovered 100% of the 33% that the first nonwoven web layer was stretched thereby causing the bulking of the composite.

[0044] Once the composite had been formed, a sample was tested for delamination. This sample also delaminated at or before being elongated 25%.

TABLE 3

EXAMPLE: NONWOVEN / NONWOVEN

EXTENSIBLE LAYER:	27,13g/m^2(0.8 oz/yd2)PP Spunbond (0,33 tex 3dpf)	V1=6,4(21)
BULKED LAYER:	27,13g/m^2(0.8 oz/yd2)Polypropylene Spunbond	V2=8,5(28)
		V0=8,5(28)
LAMINATION:		V3=6,4(21)

Process Conditions:
- Pattern Roll Temperature: 135°C (275°F)
- Anvil Roll Temperature: 135°C (275°F)
- Nip Pressure: 13,8 N/cm² (20 psi)

BULK ENHANCEMENT:

Nonstretched Laminate	Bulk (B_1):0,41mm(0.0162")
	Basis Weight (BW_1): 54,26g/m^2(1.6 oz/yd2)
Stretched Laminate	Bulk (B_2): 1,2mm(0.0465")
	Basis Weight (BW_2):60g/m^2(1.77 oz/yd2)
% Change	Bulk: 187%
	Basis Weight: 10%

% STRETCH: $\frac{28-21}{21} * 100 = 33\%$

% RECOVERY: $\frac{28-21}{28-21} * 100 = 100\%$

Laminate Testing: Laminate failed at or before 25% elongation.

EXAMPLE 4

[0045] In Example 4, the stretch-pillowed laminate material according to the present invention was formed using the same film as described in Example 1. Unlike the other examples, however, in this example a bulked nonwoven layer was attached to either side of the film layer as shown in Figure 5 thereby forming a three layer structure. Both of the spunbond nonwoven webs were made by the Kimberly-Clark Corporation of Neenah, Wisconsin using Exxon polypropylene. The bottom spunbond polypropylene nonwoven web utilized 0,24 tex (2.2 denier) fibers, had a basis weight of 13,56 g/m^2 (0.4 osy) and was thermally prebonded with an overall bond area of 15%. The top spunbond polypropylene nonwoven web utilized 0,2 tex (1.8 denier) fibers, had a basis weight of 11,87 g/m^2 (0.35 osy) and was thermally prebonded with an overall bond area of 15%. The film and nonwoven webs were subjected to a bonding process similar to that shown in Figure 4. The calender rolls used to bond the three layers included a pattern roll heated to a temperature of 135°C (275°F) and an anvil roll heated to a temperature of 135°C (275°F) with the nip pressure being 0,17 N/mm^2 (25 lbs. per square inch). The total thermal point bond area of the overall structure was 15%. As shown in Table 4, the extensible polypropylene film layer was driven at a speed V1 of 1,2 m/min (3.5 feet per minute), the spunbond web layers were each traveling at speeds V2 and V2' respectively of 12,88 m/min 37 feet per minute) and at the point of lamination

the composite was traveling at a speed V0 of 12,88 m/min (37 feet per minute). On the winder roll the composite was taken-up at a speed V3 of 12,18 m/min (35 feet per minute). In Example 4, the film was stretched 960% beyond its original or first length L1 before the nonwoven web layers were bonded to either side of the film layer. The stretched length corresponded to the second length L2 discussed above. After the bonding process the nonwoven/film/nonwoven web composite was allowed to retract from its second length L2 to a third length L3. As can be seen in Table 4, the bulk (B_2) of the stretched composite laminate was 0,48 mm (0.019 inches) and the basis weight (BW_2) was 34,59 g/m^2 (1.02 ounces per square yard). This is in comparison to the bulk (B_1) and basis weight (BW_1 of the materials as if they were in a non-stretched state in which case the bulk (B_1) would be 0,3 mm (0.0117 inches) and the basis weight (BW_1)would be 41,57 g/m^2 (1.226 ounces per square yard).

[0046] Using the formulas denoted in Example 1, the percent stretch for the material of Example 4 was 960% and the percent recovery was 6%. The percent change in bulk was 63% and the percent change in basis weight was -17%. This represents a net decrease in the basis weight of the composite material while still showing an increase in bulk. This was due to the extreme stretching of the film which caused the reduction in basis weight. However, upon the bonding together of the three layers, there was still a retraction of 6% which caused the nonwoven layers to gather up thereby increasing the bulk.

[0047] Once the composite had been formed, a sample was tested for delamination and failed at or before it reached an elongation of 25%.

TABLE 4

EXAMPLE: NONWOVEN / FILM / NONWOVEN

EXTENSIBLE LAYER:	16,51um(0.65 mil)soft polypropylene	V1=1,2(3.5)
TOP BULKED LAYER:	11,87g/m^2(0.35 oz/yd2)PP Spunbond 0,2 tex(1.8 dpf)	V2=12,88(37)
BOTTOM BULKED LYR:	13,56g/m^2(0.4 oz/yd2)PP Spunbond 0,24 tex(2.2 dpf)	V2'=12,88(37)
LAMINATION:	Thermal Point Bonded (15% Bond Area)	V0=12,88(37)
		V3=12,18(35)

Process Conditions: Pattern Roll Temperature: 135°C (275°F)
Anvil Roll Temperature: 135°C (275°F)
Nip Pressure: 0,17N/mm^2(25 psi)

BULK ENHANCEMENT:

Nonstretched Laminate	Bulk (B_1): 0,3mm(0.0117")	Basis Weight (BW_1): 41,57g/m^2(1.226 oz/yd2)
Stretched Laminate	Bulk (B_2): 0,48mm(0.019")	Basis Weight (BW_2):34,59g/m^2(1.02 oz/yd2)
% Change	Bulk: 63%	Basis Weight: -17%

% STRETCH: $\frac{37-3.5}{3.5} * 100 = 960\%$

% RECOVERY: $\frac{37-35}{37-3.5} * 100 = 6\%$

Laminate Testing: Laminate failed at or before 25% elongation.

EXAMPLE 5

[0048] In Example 5, the stretch-pillowed laminate material according to the present invention included 15,24 µm (0.6 mil) ethylene-maleic anhydride (EMA) cast film using Chevron 2207 EMA polymer from the Chevron Corporatio of San Francisco, California. The second or bulked layer was a 12,21 g/m^2 (0.36 osy) thermally bonded carded web made by Streans Canada, Inc., of Mississauga, Ontario, Canada, using T176 polypropylene fibers 0,24 tex (2.2 denier) from Hercules Canada, Iberville, Quebec, Canada. The film and bonded carded web were subjected to a bonding process simmilar to that shown in Figure 3. The calender rolls used to bond the two layers together included a pattern roll heated to a temperature of 93°C (200° F) and an anvil roll heated to a temperature of 66°C (150°F) with the nip pressure being 0,17 N/mm^2 (25 lbs. per square inch). As shown in Table 5, the extensible EMA film layer was driven at a speed V1 of 4,18 m/min (12 feet per minute), the bonded carded web layer was traveling at a speed V2 of 8 m/min (23 feet per minute) and at the point of lamination the composite was traveling at a speed V0 of 8 m/min (23 feet per minute). On

the winder roll the composite was taken-up at a speed V3 of 7,31 m/min (21 feet per minute). In Example 5, the film was stretched 92% beyond its original or first length L1 before the bonded carded web layer was bonded to the film layer. The stretched length corresponded to the second length L2 discussed above. After the bonding process the film/non-woven web composite was allowed to retract from its second length L2 to a third length L3. As can be seen in Table 5, the bulk (B_2) of the stretched composite laminate was 0,38 mm (0.015 inches) and the basis weight (BW_2) was 32,21 g/m^2 (0.95 ounces per square yard). This is in comparison to a bulk (B_1) of 0,127 mm (0.005 inches) and basis weight (BW_1) of 27.81g/m^2 (0.82 osy) if the materials were in a non-stretched state.

[0049] Using the formulas denoted in Example 1, the percent change in bulk was 200% and the percent change in basis weight was 15.8% which represented an increase in both the bulk and basis weight of the bulked and stretched laminate as opposed to a non-bulked and non-stretched material. The percent stretch for the material was 92% and the percent recovery was 18%. Consequently, the film layer was stretched 92% beyond its unstretched length, the nonwoven layer was bonded to the film layer and the composite recovered 18% of the 92% that the film was stretched thereby causing the bulking of the composite.

[0050] Once the composite had been formed, a sample was tested for delamination and once again the sample failed thereby demonstrating that the composite was not elastic.

TABLE 5

EXAMPLE: NONWOVEN / FILM

EXTENSIBLE LAYER: 15,24µm(0.6 mil)EMA Cast Film
BULKED LAYER: 12,21g/m^2(0.36 oz/yd2)PP Staple TBCW

V1=4,18(12)
V2=8(23)
V0=8(23)
V3=7,31(21)

LAMINATION: Thermal Point Bonded (15% Bond Area)

Process Conditions:
Pattern Roll Temperature: 93°C (200°F)
Anvil Roll Temperature: 66°C (150°F)
Nip Pressure: 0,17 N/mm^2 (25 psi)

BULK ENHANCEMENT:

Nonstretched Laminate	Bulk (B_1):0,127mm(0.005") Basis Weight (BW_1):27,81g/m^2(0.82 oz/yd2)
Stretched Laminate	Bulk (B_2): 0,38mm(0.015") Basis Weight (BW_2): 32,21g/m^2(0.95 oz/yd2)
% Change	Bulk: 200% Basis Weight: 15.8%

% STRETCH: $\frac{23-12}{12} * 100 = 92\%$

% RECOVERY: $\frac{23-21}{23-12} * 100 = 18\%$

Laminate Testing: laminate failed at or before 25% elongation.

EXAMPLE 6

[0051] In Example 6, the stretch-pillowed laminate material according to the present invention was formed using a 15,24 µm (0.06 mil) soft polypropylene blown film made from Exxtral Reactor TPO polymer from Exxon Chemical Company of Houston, Texas. The second or bulked layer was a 12,21 g/m^2 (0.36 ounce per square yard polypropylene staple fiber thermally bonded carded web used in Example 5. The film and bonded carded web were subjected to a bonding process similar to that shown in Figure 3. The calendar rolls used to bond the two layers together included a pattern roll heated to a temperature of 121°C (250°F) and an anvil roll to a temperature of 93°C (210°F) with the nip pressure being 0,17 N/mm^2 (25 pounds per square inch). As shown in Table 6, the extensible polypropylene film layer was driven at a speed V1 of 1 m/min (3 feet per minute), the bonded carded web was traveling at a speed V2 of 3,5 m/min (10 feet per minute) and at the point lamination the composite was traveling at a speed V0 of 3,5 m/min (10 feet

per minute). On the winder roll the composite was taken-up at a speed V3 of 3,13 m/min (9 feet per minute). In Example 6, the film was stretched 233% beyond its original or first length L1 before the nonwoven layer was bonded to the film layer. The stretched length corresponded to the second length L2 discussed above. After the bonding process the film/nonwoven web composite was allowed to retract from its second length L2 to a third length L3. Referring to Table 6, the bulk (B_2) of the stretched composite was 1,04 mm (0.041 inches) and the basis weight (BW_2) was 27,81 g/m^2 (0.82 ounces per square yard). This is in comparison to a bulk (B_1) of 0,127 mm (0.005 inches) and a basis weight (BW_1) of 23,4 g/m^2 (0.69 ounces per square yard) if the materials were in a non-stretched state.

[0052] Again using the formulas noted in Example 1, the percent change in bulk was 720% and the percent change in basis weight was 18.8%. This represented an increase in both the bulk and basis weight of the bulked and stretched laminate as opposed to a non-bulked and non-stretched material. The percent stretch for the material of Example 6 was 233% and the percent recovery was 14%. Consequently, the film layer was stretched 233% beyond its unstretched length, the nonwoven layer was bonded to the film and the composite recovered 14% of the 233% that the film was stretched thereby causing the bulking of the composite.

[0053] Once the composite had been formed, a sample was tested to see how much strength the sample could be placed under before delamination. Again the sample delaminated when stretched 25%.

TABLE 6

EXAMPLE: NONWOVEN / FILM

EXTENSIBLE LAYER:	15,24µm(0.6 mil)Soft PP Blown Film	V1=1(3)
BULKED LAYER:	12,21g/m^2(0.36 oz/yd2)PP Staple TBCW	V2=3.5(10)
		V0=3.5(10)
LAMINATION:	Thermal Point Bonded (15% Bond Area)	V3=3.13(9)

Process Conditions:	Pattern Roll Temperature:	121°C (250°F)
	Anvil Roll Temperature:	93°C (210°F)
	Nip Pressure:	0,17 N/mm^2(25 psi)

BULK ENHANCEMENT:

Nonstretched Laminate	Bulk (B_1): 0,127mm(0.005") Basis Weight (BW_1)23,4g/m^2(0.69 oz/yd2)
Stretched Laminate	Bulk (B_2): 1,04mm Basis Weight (BW_2): 27,81g/m^2(0.82 oz/yd2)
% Change	Bulk: 720% Basis Weight: 18.8%

% STRETCH: $\frac{10-3}{3} * 100 = 233\%$

% RECOVERY: $\frac{10-9}{10-3} * 100 = 14\%$

Laminate Testing: Laminate failed at or before 25% elongation.

EXAMPLE 7

[0054] In Example 7 the first or extensible layer was formed from a 15,24 µm (0.6 mil) soft polypropylene blown film made from Eastman Reactor TPO P6-005 polymer from Eastman Chemicals Division of Eastman Kodak Company of Rochester, New York. The second or bulked layer was the same material as used in Example 6. The film and bonded carded web were subjected to a bonding process similar to that shown in Figure 3. The temperature of the pattern and anvil rolls as well as the nip pressure were the same as those in Example 6. Referring to Table 7, the extensible polypropylene film layer was driven at a speed V1 of 4,18 m/min (12 feet per minute), the bonded carded web layer was traveling at a speed V2 of 11,27 m/min (41 feet per minute) and at the point of lamination the composite was traveling at a speed V0 of 14,27 m/min (41 feet per minute). The laminate taken-up on the winder roll had a percent bond area

of 15% and was taken-up at a speed V3 of 12,56 m/min (36 feet per minute). The film layer was stretched 242% beyond its original or first length L1 before the bonded carded web was bonded to the film layer. The stretched length corresponded to the second length L2 discussed above. After the bonding process the film/nonwoven web composite was allowed to retract from its second length L2 to a third length L3. As can bee seen in Table 7, the bulk (B_2) of the stretched composite laminate was 0,46 mm (0.018 inches) and the basis weight (BW_2) was 24,08 g/m^2 (0.71 ounces per square yard). This is in comparison to a bulk (B_1) of 0,127 mm (0.005 inches) and a basis weight (BW_1) of 25,43 g/m^2 (0.75 ounces per square yard) for the materials as if they were in a non-stretched state.

[0055] Using the formulas from Example 1, the percent change in bulk was 260% and the percent change in basis weight was a -5%. This represented a net decrease in the basis weight of the material while still showing an increase in bulk. As with Example 2, the negative basis weight of the composite was due to the extreme stretching of the film layer. The percent stretch for the material in Example 7 was 242% and the percent recovery was 17%. Consequently, the film layer was stretched 242% beyond its unstretched length, the nonwoven layer was bonded to the film and the composite recovered 17% of the 242% that the film was stretched thereby causing the bulking of the composite.

TABLE 7

EXAMPLE: NONWOVEN / FILM

EXTENSIBLE LAYERR:	16,51um(0.65 mil)soft PP blown film	V1=4,18(12)
BULKED LAYER:	12,21g/m^2(0.36 oz/yd2)PP Staple TBCW	V2=14,27(41)
LAMINATION:	Thermal Point Bonded (15% Bond Area)	V0=14,27(41)
		V3=12,53(36)
Process Conditions:	Pattern Roll Temperature: 121°C (250°F) Anvil Roll Temperature: 99°C (210°F) Nip Pressure: 0,17 N/mm^2 (25 psi)	
BULK ENHANCEMENT:		
Nonstretched Laminate	Bulk (B_1): 0,127mm(0.005") Basis Weight (BW_1): 24,43g/m^2(0.75 oz/yd2)	
Stretched Laminate	Bulk (B_2): 0,46mm(0.018") Basis Weight (BW_2):24,08g/m^2(0.71 oz/yd2)	
% Change	Bulk: 260% Basis Weight: -5%	

% STRETCH: $\frac{41-12}{12} * 100 = 242\%$

% RECOVERY: $\frac{41-36}{41-12} * 100 = 17\%$

[0056] Samples of materials similar to the foregoing examples were converted into a prototype diaper construction with the material of the present invention being utilized as the outercover of the diaper. Typical diaper constructions include a liquid pervious top sheet and a substantially liquid impervious backing sheet or outercover. Disposed between

the too sheet and the backing sheet is an absorbent core. The soft nonwoven layer of the film/nonwoven laminate was placed on the exterior of the diaper so as to provide a cloth-like outercover. The same film and nonwoven layers were also manufactured into a standard two-ply bonded laminate with no pillowing. This material was also made into diaper outercover. When both the pillowed and non-pillowed diapers were subjected to site and handling panels the stretch-pillowed material of the present invention was found to be more preferred than the simple two-dimensional outercover material. The diaper with the stretch-pillowed material of the present invention was perceived as having more definition, durability and quality. As a result, the material of the present invention when used in conjunction with a diaper yielded a product with a higher acceptance rate than two-dimensional materials. A particularly favorable material according to the present invention included a first layer of 12,7 μm (0.5 mil) polyethylene film with a 23,74 g/m^2 (0.7 ounce per square yard)spunlace material available from E. I. DuPont de Nemours and Company of Wilmington, Delaware and sold under the trademark SONTARA. These two layers were laminated together at a plurality of discrete bond points using 0,36 g/m^2 (0.3 grams per square yard) of a hot melt adhesive identified as H-2096 from Findley Adhesives, Inc. of Wauwatosa, Wisconsin.

[0057] The material described in the preceding examples is particularly useful as an outercover material for personal care products, however, it has other applications as outlined previously. In addition, it should be noted that this laminate as well as other laminate combinations may be subjected to additional processing to enhance the overall attributes of the particular composite material. For example, either one or both of the layers in a two layer structure or one or all three of the layers in a three or multi-layer structure may be embossed either before or after laminating/bonding the layers together. In addition, aperturing is also possible. Furthermore, it is possible to interject specific materials between the first and second layers just prior to the bonding process as, for example, fluid handling materials such as superabsorbents to further enhance the overall properties of the present invention.

Claims

1. A bulked, stretch-pillowed laminate (10) comprising:

   a first substantially non-elastic layer (12) consisting of a non-elastomeric material and a second layer (14), said second layer (14) being attached to said first layer (12) at a plurality of spaced-apart bond sites (16) to form a bulked laminate (10) with a plurality of bonded and unbonded areas (16,18), said laminate (10) being bulked due to said second layer (14) having more surface area than said first layer (12) per the same unit area of said laminate (10), said laminate (10) being substantially non-elastic and being capable of stretching no more than 25% without delaminating.

2. The bulked, stretch-pillowed laminate of claim 1 wherein a third layer (15) is attached to said first substantially non-elastic layer (12) on a side of said first layer (12) opposite said second layer (14), said third layer (15) being attached to said first layer (12) at a plurality of spaced-apart bond sites (19) to form a plurality of bonded and unbonded areas (19,21) between said first and third layers (12,15), said third layer (15) having more surface area than said first layer (12) per the same unit area of said laminate (10).

3. The bulked, stretch-pillowed laminate of claim 2 wherein said space-apart bond sites (16,19) of attachment of said second and third layers (14,15) to said first layer (12) are in registry with one another.

4. The bulked, stretch-pillowed laminate of claim 2 wherein said spaced-apart bond sites of attachment of said second and third layers (14,15) to said first layer (12) are not in registry with one another.

5. The bulked, stretch-pillowed laminate of any one of claims 1 to 4, wherein said first layer (12) is permanently deformed.

6. A personal care absorbent article comprising:

   a liquid-pervious top sheet and a substantially liquid-impervious backing sheet with an absorbent core disposed between said top sheet and said backing sheet, said backing sheet being made from a bulked, stretch-pillowed laminate (10) according to any one of claims 1 to 5.

7. A personal care absorbent article comprising:

   a liquid-pervious top sheet and a substantially liquid-impervious backing sheet with an absorbent core disposed between said top sheet and said backing sheet, said top sheet being made from a bulked, stretch-pil-

lowed laminate (10) according to any one of claims 1 to 5.

8. A process for forming a bulked stretch-pillowed laminate (10) according to any one of claims 1 to 7, comprising:

(a) extending a first extensible layer (12) consisting of a non-elastomeric material from an original length (L1) to an expanded length (L2), said expanded length (L2) being at least 5 percent greater than said original length (L1) and said first extensible layer (12) being permanently deformed as a result of said extension;

(b) placing a second layer (14) in juxtaposition with said first layer (12) while said first layer (12) is in said expanded length (L2);

(c) attaching said first and second layers (12,14) to one another at a plurality of spaced-apart bond sites (16) to form said laminate such that there are a plurality of bonded and unbonded areas; and

(d) allowing said first layer (12) of said laminate (10) to relax to a permanently deformed length (L3) which is still longer than said original length (L1) but less than said expanded length (L2), said laminate (10) having a plurality of bulked areas (18) in the locations where said first and second layers (12,14) are unbonded.

9. The process of claim 8 wherein a third layer (15) is attached to said first layer (12) while said first layer is in an expanded state.

10. The process of claim 9 wherein said third layer (15) is attached to said first layer (12) at a plurality of spaced-apart bond sites (19) which are in registry with the bond sites (16) of said first and second layers (12,14).

11. The process of claim 9 wherein said third layer (15) is attached to said first layer (12) at a plurality of spaced-apart bond sites which are not in registry with the bond sites (16) of said first and second layers (12,14).

12. The process of any one of claims 9 to 11 wherein said third layer (15) is extended prior to said first and third layers (12,15) being attached to one another.

13. The process of any one of claims 8 to 12 wherein said first layer (12) is permanently deformed to a length which is from about 2 to 23.4% less than said expanded length L_2.

14. The process of any one of claims 8 to 12 wherein said deformed length (L3) of said first layer (12) is caused by the relaxation of said first layer from said expanded length (L2) to a retracted length, with said retracted length being between about 80 and 98% of said expanded length (L2).

15. The process of any one of claims 8 to 14 wherein said extension of said first layer (12) is in more than one direction.

16. The process of any one of claims 8 to 14 wherein said extension of said first layer (12) takes place in at least two directions which are at substantially right angles to one another.

17. The process of any one of claims 8 to 16 wherein said second layer (14) is extended prior to said first and second layers (12, 14) being attached to one another.

18. The process of claim 17 wherein the direction of said extension of said second layer (14) is substantially parallel to the direction of extension of said first layer (12).

19. The process of claim 17 wherein the direction of said extension of said second layer (14) is substantially non-parallel to the direction of extension of said first layer (12).

20. The process of any one of claims 8 to 19 wherein said first and second layers (12,14) are attached to one another through the use of heat and pressure.

21. The process of any one of claims 8 to 19 wherein said first and second layers (12,14) are attached to one another through the use of ultrasonic bonding.

22. The process of any one of claims 8 to 19 wherein said first and second layers (12,14) are attached to one another

through the use of adhesives, said adhesives being selected from the group consisting of water-based, solvent-based, pressure sensitive and hot-melt adhesives.

23. The process of any one of claims 8 to 22 wherein said first extensible layer (12) includes a substantially non-elastic film or a substantially non-elastic fibrous web.

24. The process of claim 8 wherein said first layer (12) includes a thermoplastic film, such as a polypropylene film, or an EMA film or a polyethylene film, or a polypropylene nonwoven web.

25. The bulked, stretched-pillowed laminate of any one of claims 1 to 5 wherein the first layer (12) includes a substantially non-elastic film or substantially non-elastic fibrous web.

26. The bulked, stretched-pillowed laminate of claim 1 wherein said first layer (12) includes a thermoplastic film, such as a polypropylene film, or an EMA film or a polyethylene film, or a polypropylene nonwoven web.

Patentansprüche

1. Gebauschtes, kissenbildend verstrecktes Laminat (10) mit einer ersten, im wesentlichen nicht elastischen Schicht (12), die aus einem nicht-elastomeren Material besteht, und einer Zweiten Schicht (14), wobei die Zweite Schicht (14) an der ersten Schicht (12) an einer Vielzahl von Zueinander beabstandeten Verbindungspunkten (16) befestigt ist, um ein gebauschtes Laminat (10) mit einer Vielzahl von gebundenen und ungebundenen Flächenbereichen (16, 18) zu bilden, wobei das Laminat (10) dadurch aufgebauscht ist, daß die Zweite Schicht (14) mehr Oberflächenbereich als die erste Schicht (12) pro gleicher Einheitsfläche des Laminats (10) aufweist, wobei das Laminat (10) im wesentlichen nicht elastisch ist und nicht mehr als 25 % ohne Delamination verstreckt werden kann.

2. Gebauschtes, kissenartig verstrecktes Laminat nach Anspruch 1, wobei eine dritte Schicht (15) mit der ersten, im wesentlichen nicht elastischen Schicht (12) an einer Seite der ersten Schicht (12) verbunden ist, die der Zweiten Schicht (14) gegenüberliegt, wobei die dritte Schicht (15) an der ersten Schicht (12) an einer Vielzahl von zueinander beabstandeten Verbindungsstellen (9) befestigt ist, um eine Vielzahl von gebundenen und ungebundenen Flächenbereichen (19, 21) zwischen den ersten und dritten Schichten (12,15) zu bilden, wobei die dritte Schicht (15) mehr Oberflächenbereich als die erste Schicht (12) pro gleicher Einheitsfläche des Laminats (10) aufweist.

3. Gebauschtes, kissenartig verstrecktes Laminat nach Anspruch 2, wobei die Zueinander beabstandeten Verbindungsstellen (16, 19) der Verbindung der zweiten und dritten Schichten (14, 15) mit der ersten Schicht (12) sich in fluchtender Ausrichtung zueinander befinden.

4. Gebauschtes, kissenartig verstrecktes Laminat nach Anspruch 2, wobei sich die zueinander beabstandeten Verbindungsstellen der Befestigung der zweiten und dritten Schichten (14, 15) mit der ersten Schicht (12) sich nicht in fluchtender Ausrichtung zueinander befinden.

5. Gebauschtes, kissenartig verstrecktes Laminat nach einem der Ansprüche 1 bis 4, wobei die erste Schicht (12) bleibend verformt ist.

6. Absorbierender Artikel für die persönliche Hygiene mit einem flüssigkeitsdurchlässigen, oberen Flächenmaterial und einem im wesentlichen flüssigkeitsundurchlässigen, rückwärtigen Flächenmaterial mit einem zwischen dem oberen Flächenmaterial und dem rückwärtigen Flächenmaterial angeordneten, absorbierenden Kern, wobei das rückwärtige Flächenmaterial aus einem gebauschten, kissenartig verstreckten Laminat (10) nach einem der Ansprüche 1 bis 5 hergestellt ist.

7. Absorbierender Artikel für die persönliche Hygiene mit einem flüssigkeitsdurchlässigen, oberen Flächenmaterial und einem im wesentlichen flüssigkeitsundurchlässigen, rückwärtigen Flächenmaterial mit einem zwischen dem oberen Flächenmaterial und dem rückwärtigen Flächenmaterial angeordneten, absorbierenden Kern, wobei das obere Flächenmaterial aus einem gebauschten, kissenartig verstreckten Laminat (10) nach einem der Ansprüche 1 bis 5 hergestellt ist.

8. Verfahren zum Herstellen eines gebauschten, kissenbildend verstreckten Laminats (10) nach einem der Ansprüche 1 bis 7, wobei:

(a) eine erste ausdehnbare Schicht (12), die aus einem nicht-elastomeren Material besteht, von einer Originallänge (L1) auf eine expandierte Länge (L2) ausgedehnt wird, wobei die expandierte Länge (L2) mindestens 5 % größer als die Originallänge (L1) ist und die erste ausdehnbare Schicht (12) im Ergebnis der Ausdehnung permanent verformt wird;

(b) eine zweite Schicht (14) die erste Schicht (12) überlagernd angeordnet wird, während sich die erste Schicht (12) auf ihrer expandierten Länge (L2) befindet;

(c) die ersten und zweiten Schichten (12, 14) an einer Vielzahl von beabstandeten Verbindungsstellen (16) aneinander angebracht werden, um das Laminat derart zu bilden, daß eine Vielzahl von gebundenen und ungebundenen Flächenbereichen entstehen; und

(d) sich die erste Schicht (12) des Laminats (10) auf eine permanent verformte Länge (L3) entspannen kann, die noch länger als die originale Länge (L1) jedoch kürzer als die expandierte Länge (L2) ist, wobei das Laminat (10) eine Vielzahl von gebauschten Bereichen (18) an den Stellen aufweist, wo die ersten und zweiten Schichten (12, 14) unverbunden sind.

9. Verfahren nach Anspruch 8, wobei eine dritte Schicht (15) an der ersten Schicht (12) angeordnet wird, während sich die erste Schicht in einem expandierten Zustand befindet.

10. Verfahren nach Anspruch 9, wobei die dritte Schicht (15) an der ersten Schicht (12) an einer Vielzahl von zueinander beabstandeten Stellen (19) angeordnet wird, die mit den Verbindungsstellen (16) der ersten und zweiten Schichten (12, 14) ausgerichtet sind.

11. Verfahren nach Anspruch 9, wobei die dritte Schicht (15) an der ersten Schicht (12) an einer Vielzahl von zueinander beabstandeten Verbindungsstellen angeordnet wird, die sich nicht in Ausrichtung mit den Verbindungsstellen (16) der ersten und zweiten Schichten (12, 14) befinden.

12. Verfahren nach einem der Ansprüche 9 bis 11, wobei die dritte Schicht (15) ausgedehnt wird, bevor die ersten und dritten Schichten (12, 15) aneinander befestigt werden.

13. Verfahren nach einem der Ansprüche 8 bis 12, wobei die erste Schicht (12) permanent auf eine Länge (L3) verformt ist, die zwischen etwa 2 bis etwa 23,4 % geringer als die expandierte Länge (L2) ist.

14. Verfahren nach einem der Ansprüche 8 bis 12, wobei die verformte Länge (L3) der ersten Schicht (12) verursacht wird durch die Entspannung der ersten Schicht aus der expandierten Länge (L2) auf eine zurückgezogene Länge, wobei die zurückgezogene Länge zwischen etwa 80 und 98 % der expandierten Länge (L2) beträgt.

15. Verfahren nach einem der Ansprüche 8 bis 14, wobei die Ausdehnung der ersten Schicht (12) in mehr als einer Richtung durchgeführt wurde.

16. Verfahren nach einem der Ansprüche 8 bis 14, wobei die Ausdehnung der ersten Schicht (12) in mindestens zwei Richtungen stattfindet, die sich unter im wesentlichen rechten Winkeln zueinander befinden.

17. Verfahren nach einem der Ansprüche 8 bis 16, wobei die zweite Schicht (14) ausgedehnt wird, bevor die ersten und zweiten Schichten (12, 14) aneinander befestigt sind.

18. Verfahren nach Anspruch 17, wobei die Richtung der Ausdehnung der zweiten Schicht (14) sich im wesentlichen parallel zur Richtung der Ausdehnung der ersten Schicht (12) erstreckt.

19. Verfahren nach Anspruch 17, wobei die Richtung der Ausdehnung der zweiten Schicht (14) im wesentlichen nicht parallel zur Richtung der Ausdehnung der ersten Schicht (12) verläuft.

20. Verfahren nach einem der Ansprüche 8 bis 19, wobei die ersten und zweiten Schichten (12, 14) aneinander unter Verwendung von Wärme und Druck befestigt werden.

21. Verfahren nach einem der Ansprüche 8 bis 19, wobei die ersten und zweiten Schichten aneinander durch die Verwendung einer Ultraschallbindung befestigt werden.

22. Verfahren nach einem der Ansprüche 8 bis 19, wobei die ersten und zweiten Schichten (12, 14) aneinander durch die Verwendung von Klebstoffen befestigt werden, wobei die Klebstoffe ausgewählt werden aus einer Gruppe, die besteht aus Klebstoffen auf Wasserbasis, Klebstoffen auf Lösungsmittelbasis, drucksensitive und heißschmelzende Klebstoffe.

23. Verfahren nach einem der Ansprüche 8 bis 22, wobei die erste Schicht (12) einen im wesentlichen nicht elastischen Film oder eine im wesentlichen nicht elastische Faserbahn enthält.

24. Verfahren nach Anspruch 8, wobei die erste Schicht (12) einen thermoplastischen Film, beispielsweise einen Polypropylenfilm, oder einen EMA-Film, oder einen Polyäthylenfilm oder eine nicht gewebte Polypropylenbahn enthält.

25. Gebauschtes, kissenartig verstrecktes Laminat nach einem der Ansprüche 1 bis 5, wobei die erste Schicht (12) einen im wesentlichen nicht elastischen Film oder eine im wesentlichen nicht elastische Faserbahn enthält.

26. Gebauschtes, kissenartig verstrecktes Laminat nach Anspruch 1, wobei die erste Schicht (12) einen thermoplastischen Film, beispielsweise einen Polypropylenfilm, oder einen EMA-Film, oder einen Polyäthylenfilm oder eine nicht gewebte Polypropylenbahn enthält.

Revendications

1. Stratifié gonflant ondulé par étirage (10) comprenant :

   une première couche sensiblement non élastique (12) constituée d'une matière non élastomère et une seconde couche (14), ladite seconde couche (14) étant fixée a ladite première couche (12) en inne pluralité de sites de liaison mutuellement espacés (16) pour former un stratifié gonflant (10) avec inne pluralité de zones liées et non liées (16, 18), ledit stratifié (10) étant gonflant du fait que ladite seconde couche (14) a une surface spécifique supérieure à celle de ladite première couche (12) pour une même unité de surface dudit stratifié (10), ledit stratifié (10) étant sensiblement non élastique et étant capable d'un étirage non supérieur à 25 % sans déstratification.

2. Stratifié gonflant ondulé par étirage selon la revendication 1, dans lequel une troisième couche (15) est fixée à ladite première couche sensiblement non élastique (12) sur une face de ladite première couche (12) opposée à ladite seconde couche (14), ladite troisième couche (15) étant fixée à ladite première couche (12) en inne pluralité de sites de liaison mutuellement espacés (19) pour former une pluralité de zones liées et non liées (19, 21) entre lesdites première et troisième couches (12, 15), ladite troisième couche (15) ayant inne surface spécifique supérieure à celle de ladite première couche (12) pour une même unité de surface dudit stratifié (10).

3. Stratifié gonflant ondulé par étirage selon la revendication 2, dans lequel lesdits sites de liaison mutuellement espacés (16, 19) pour la fixation desdites seconde et troisième couches (14, 15) à ladite première couche (12) sont alignés les uns avec les autres.

4. Stratifié gonflant ondulé par étirage selon la revendication 2, dans lequel lesdits sites de liaison mutuellement espacés pour la fixation desdites seconde et troisième couches (14, 15) à ladite première couche (12) ne sont pas alignés les uns avec les autres.

5. Stratifié gonflant ondulé par étirage selon l'une quelconque des revendications 1 à 4, dans lequel ladite première couche (12) est déformée de façon

6. Article absorbant pour hygiène personnelle comprenant :

   une feuille supérieure perméable aux liquides et une feuille de renfort sensiblement imperméable aux liquides ayant inne âme absorbante disposée entre ladite feuille supérieure et ladite feuille de renfort, ladite feuille de renfort étant faite d'un stratifié gonflant ondulé par étirage (10) selon l'une quelconque des revendications 1 à 5.

7. Article absorbant pour hygiène personnelle comprenant :

   une feuille supérieure perméable aux liquides et une feuille de renfort sensiblement imperméable aux liquides

ayant une âme absorbante disposée entre ladite feuille supérieure et ladite feuille de renfort, ladite feuille supérieure étant faite d'un stratifié gonflant ondulé par étirage (10) selon l'une quelconque des revendications 1 à 5.

8. Procédé de formation d'un stratifié gonflant ondulé par étirage (10) selon l'une quelconque des revendications 1 à 7, comprenant :

   (a) l'étirage d'une première couche étirable (12) constituée d'une matière non élastomère d'une longueur initiale (L1) à une longueur étirée (L2), ladite longueur étirée (L2) étant supérieure d'au moins 5 % à ladite longueur initiale (L1) et ladite première couche extensible (12) étant déformée de façon permanente du fait dudit étirage ;
   (b) la mise en place d'une seconde couche (14) de façon juxtaposée à ladite première couche (12) pendant que ladite première couche (12) présente ladite longueur étirée (L2) ,
   (c) la fixation desdites première et seconde couches (12, 14) l'une à l'autre en une pluralité de sites de liaison mutuellement espacés (16) pour former ledit stratifié de façon à ce qu'il y ait une pluralité de zones liées et non liées ; et
   (d) le fait de laisser ladite première couche (12) dudit stratifié (10) se détendre jusqu'à une longueur déformée de façon permanente (L3) qui reste plus longue que ladite longueur initiale (L1) mais est inférieure à ladite longueur étirée (L2), ledit stratifié (10) ayant une pluralité de zones gonflées (18) aux emplacements où lesdites première et seconde couches (12, 14) ne sont pas liées.

9. Procédé selon la revendication 8, dans lequel une troisième couche (15) est fixée à ladite première couche (12) pendant que ladite première couche est à l'état étiré.

10. Procédé selon la revendication 9, dans lequel ladite troisième couche (15) est fixée à ladite première couche (12) en une pluralité de sites de liaison mutuellement espacés (19) qui sont alignés avec les sites de liaison (16) desdites première et seconde couches (12, 14).

11. Procédé selon la revendication 9, dans lequel ladite troisième couche (15) est fixée à ladite première couche (12) en une pluralité de sites de liaison mutuellement espacés qui ne sont pas alignés avec les sites de liaison (16) desdites première et seconde couches (12, 14).

12. Procédé selon l'une quelconque des revendications 9 à 11, dans lequel ladite troisième couche (15) est étirée avant que lesdites première et troisième couches (12, 15) soient fixées l'une à l'autre.

13. Procédé selon l'une quelconque des revendications 8 à 12, dans lequel ladite première couche (12) est déformée de façon permanente à une longueur (L_3) qui est inférieure d'environ 2 à 23,4 % à ladite longueur étirée (L_2).

14. Procédé selon l'une quelconque des revendications 8 à 12, dans lequel ladite longueur déformée (L3) de ladite première couche (12) est provoquée par la détente de ladite première couche de ladite longueur étirée (L2) à une longueur rétractée, ladite longueur rétractée étant d'environ 80 à 98 % de ladite longueur étirée (L2).

15. Procédé selon l'une quelconque des revendications 8 à 14, dans lequel ledit étirage de ladite première couche (12) s'effectue dans plus d'une direction.

16. Procédé selon l'une quelconque des revendications 8 à 14, dans lequel ledit étirage de ladite première couche (12) s'effectue dans au moins deux directions qui sont sensiblement perpendiculaires l'une à l'autre.

17. Procédé selon l'une quelconque des revendications 8 à 16, dans lequel ladite seconde couche (14) est étirée avant que lesdites première et seconde couches (12, 14) soient fixées l'une à l'autre.

18. Procédé selon la revendication 17, dans lequel la direction dudit étirage de ladite seconde couche (14) est sensiblement parallèle à la direction d'étirage de ladite première couche (12).

19. Procédé selon la revendication 17, dans lequel la direction dudit étirage de ladite seconde couche (14) est sensiblement non parallèle à la direction d'étirage de ladite première couche (12).

20. Procédé selon l'une quelconque des revendications 8 à 19, dans lequel lesdites première et seconde couches (12, 14) sont fixées l'une à l'autre par utilisation de chaleur et de pression.

21. Procédé selon l'une quelconque des revendications 8 à 19, dans lequel lesdites première et seconde couches (12, 14) sont fixées l'une à l'autre par utilisation d'une liason par ultrasons.

22. Procédé selon l'une quelconque des revendications 8 à 19, dans lequel lesdites première et seconde couches (12, 14) sont fixées l'une à l'autre par utilisation d'adhésifs, lesdits adhésifs étant sélectionnés dans le groupe constitué d'adhésifs à base d'eau, à base de solvant, sensibles à la pression et fondant à chaud.

23. Procédé selon l'une quelconque des revendications 8 à 22, dans lequel ladite première couche étirable (12) comporte un film sensiblement non élastique ou un voile fibreux sensiblement non élastique.

24. Procédé selon la revendication 8, dans lequel ladite première couche (12) comporte un film thermoplastique, comme un film de polypropylène, ou un film d'EMA ou un film de polyéthylène, ou un voile non tissé de polypropylène.

25. Stratifié gonflant ondulé par étirage selon l'une quelconque des revendications 1 à 5, dans lequel la première couche (12) comporte un film sensiblement non élastique ou un voile fibreux sensiblement non élastique.

26. Stratifié gonflant ondulé par étirage selon la revendication 1, dans lequel ladite première couche (12) comporte un film thermoplastique, comme un film de polypropylène, ou un film d'EMA ou un film de polyethylene, ou un voile non tissé de polypropylène

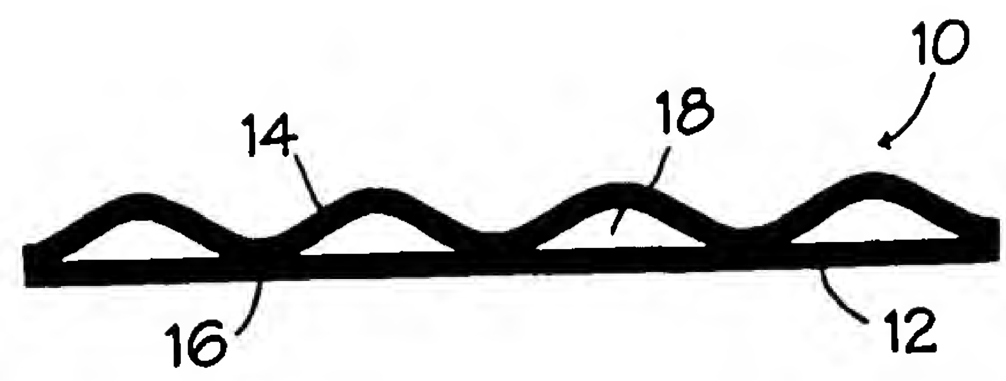

FIG. 1

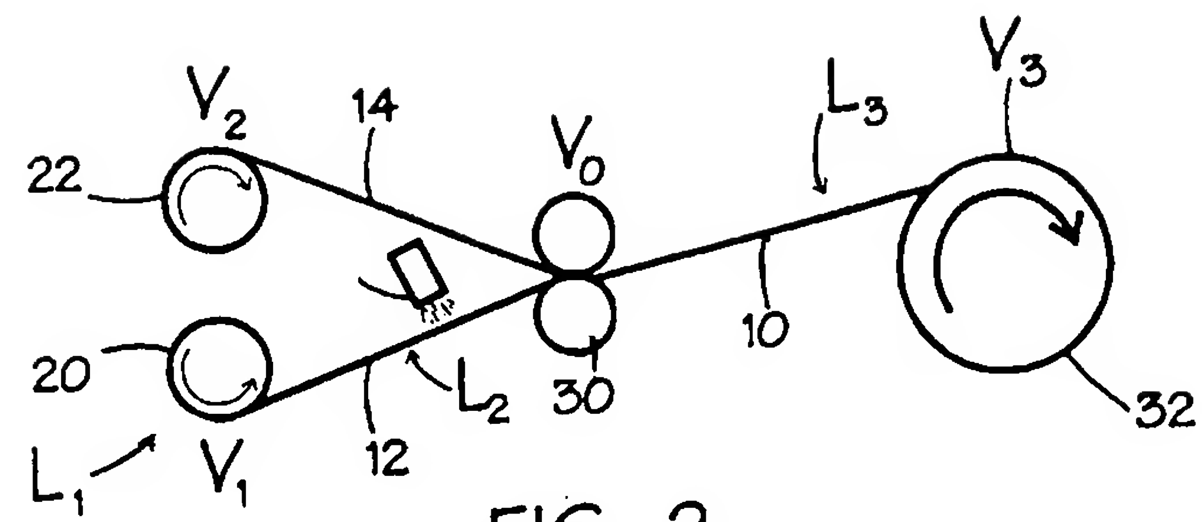

FIG. 2

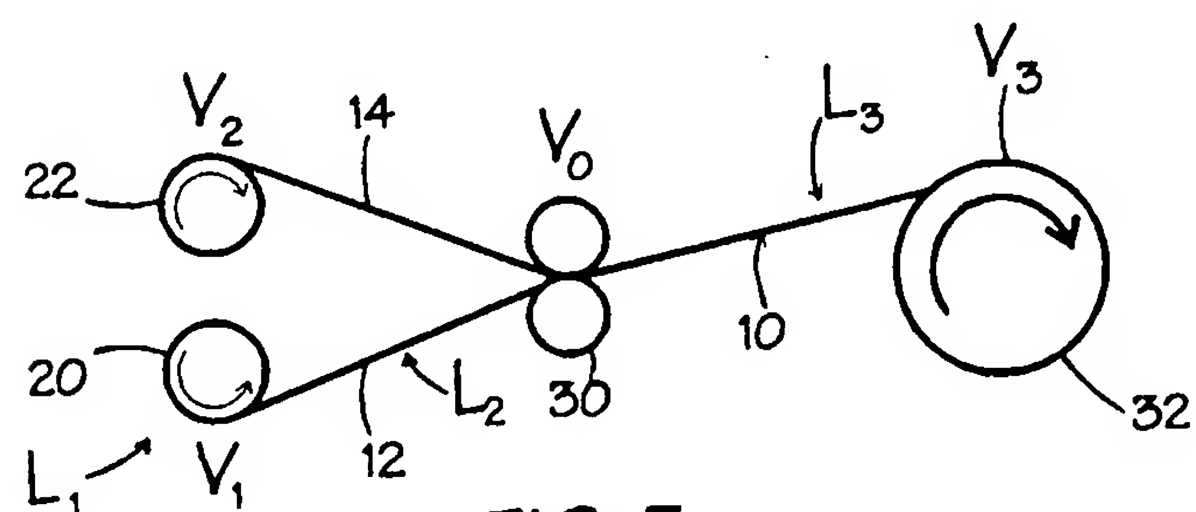

FIG. 3

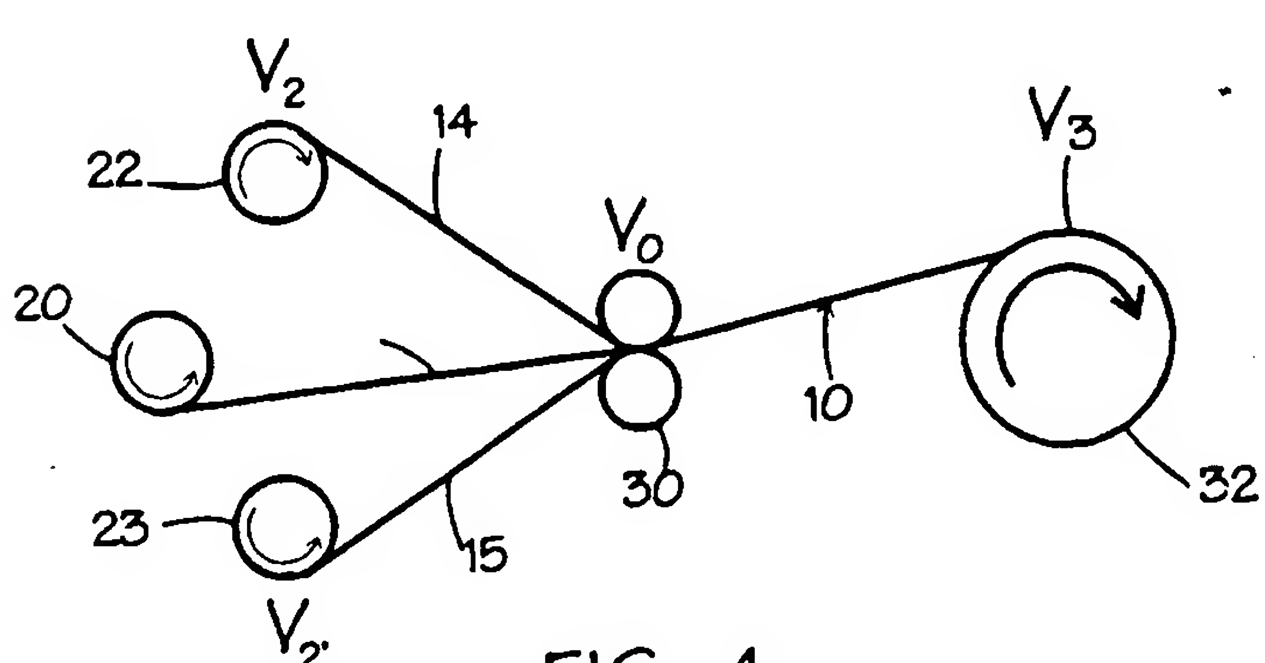

FIG. 4

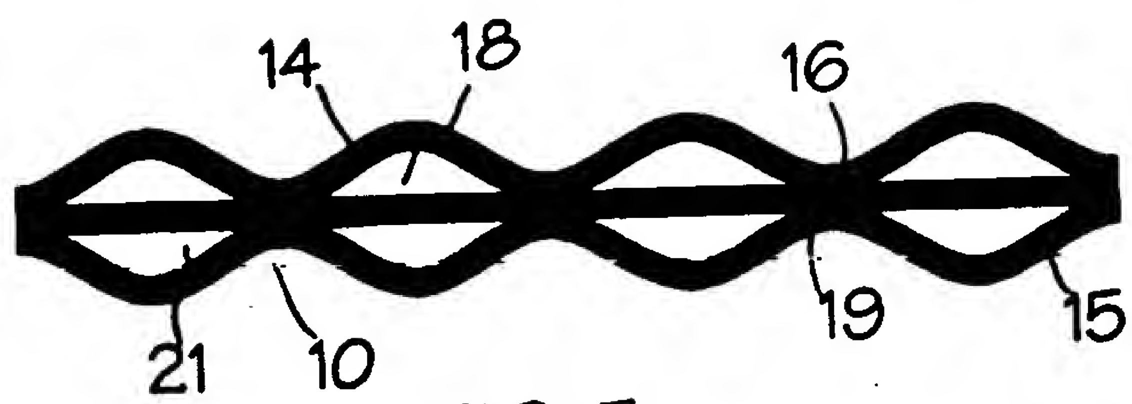

FIG. 5

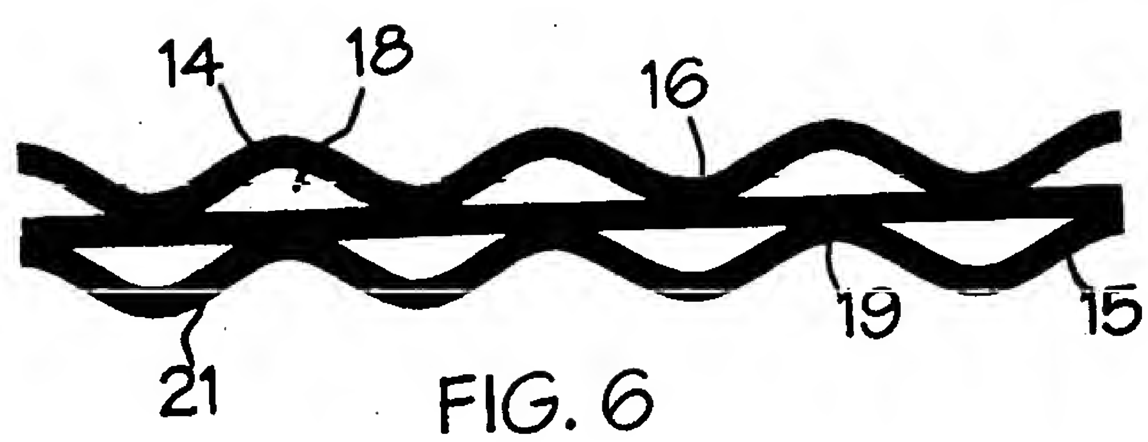

FIG. 6

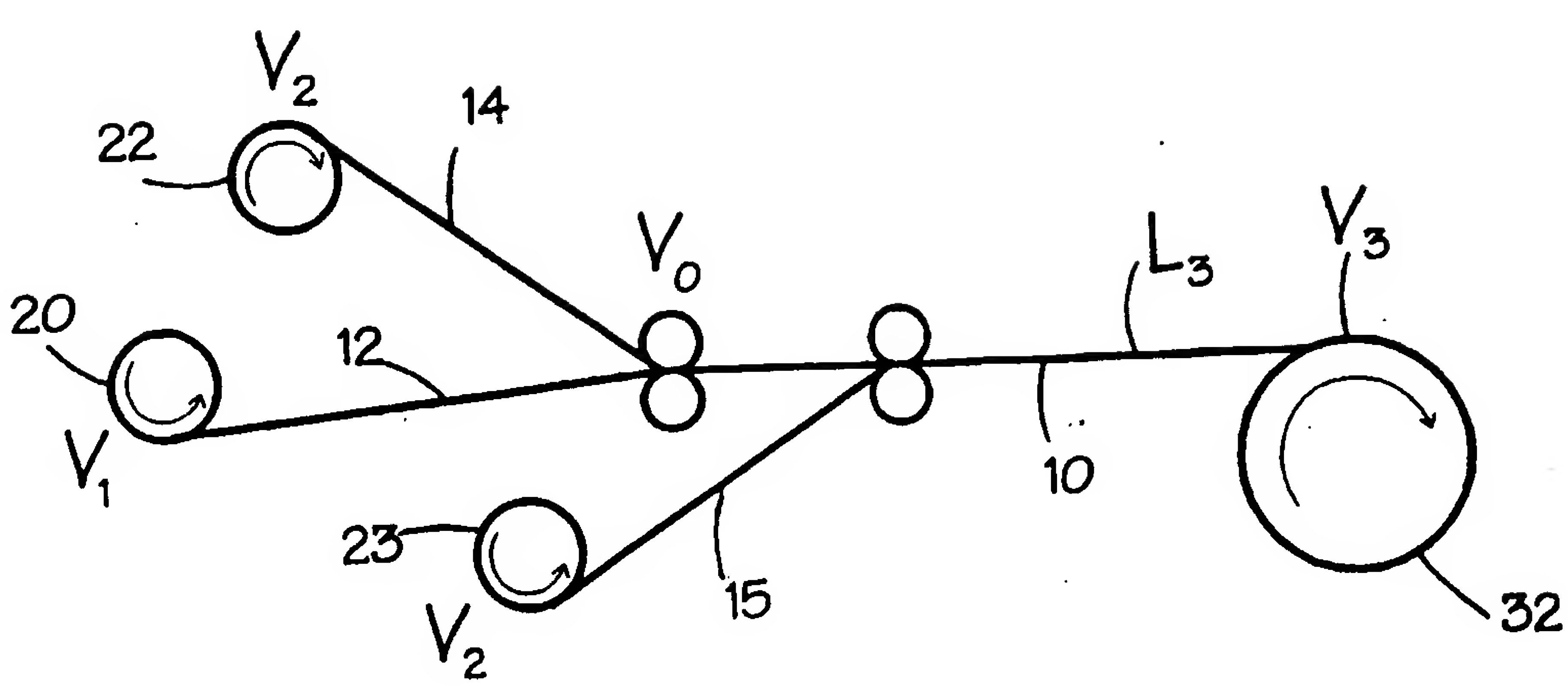

FIG. 7